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COMMITTEE ON THE PEACEFUL USES
OF OUTER SPACE

REPORT OF THE SCIENTIFIC AND TECHNICAL SUBCOMMITTEE ON THE WORK OF ITS TWENTY-NINTH SESSION

INTRODUCTION

1. The Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space held its twenty-ninth session at United Nations Headquarters from 25 February to 5 March 1992 under the chairmanship of Professor J. H. Carver (Australia). On 24 February, the Subcommittee held a special session, open to all States Members of the United Nations, as well as to the general public, commemorating International Space Year, 1992 (ISY).

2. Representatives of the following Member States attended the session: Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Burkina Faso, Cameroon, Canada, Chile, China, Colombia, Czechoslovakia, Ecuador, Egypt, France, Germany, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Italy, Japan, Lebanon, Mexico, Mongolia, Morocco, Netherlands, Nigeria, Pakistan, Philippines, Poland, Portugal, Romania, Russian Federation, Sweden, Syrian Arab Republic, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay, Viet Nam and Yugoslavia.

3. Representatives of the Centre for Science and Technology for Development, the Department of Technical Cooperation for Development and the Office of Legal Affairs of the United Nations Secretariat attended the session, as did representatives of the Economic Commission for Africa (ECA) and the Economic and Social Commission for Asia and the Pacific (ESCAP).

4. Representatives of the following specialized agencies attended the session: Food and Agriculture Organization of the United Nations (FAO), United Nations Educational, Scientific and Cultural Organization (UNESCO), World Meteorological Organization (WMO), International Atomic Energy Agency (IAEA) and United Nations Industrial Development Organization (UNIDO).

5. Representatives of the European Space Agency (ESA), the International Telecommunications Satellite Organization (INTELSAT), the Committee on Space Research (COSPAR) of the International Council of Scientific Unions (ICSU), the International Astronautical Federation (IAF) and the International Society for Photogrammetry and Remote Sensing (ISPRS) also attended the session.

6. A list of the representatives of Member States, specialized agencies and other international organizations attending the session is contained in document A/AC.105/C.1/INF/21.

7. The special session to celebrate International Space Year (ISY), sponsored by COSPAR and IAF, was addressed by the Chairman of the Space Agency Forum for International Space Year (SAFISY), Mr. Hubert Curien, Minister of Research and Technology of France, and by Dr. Louis Friedman, Executive Director of the Planetary Society, speaking on "Space Flight and Global Unification". The meeting also included a panel discussion on "Space and the Global Change Programme", with the participation of Mr. Jean-Marie Luton, Director-General of the European Space Agency; Mr. Marcio Nogueira Barbosa, Director-General of the Brazilian Institute for Space Research; Mr. Yoshihiro Ishizawa, Executive Director of the National Aerospace Development Agency of Japan; Mr. John D. Schumacher, Deputy Associate Administrator for Policy Coordination and International Relations of the United States National Aeronautics and Space Administration; Dr. M. G. Chandrasekhar, Scientific Secretary of the Indian Space Research Organization; and Mr. Jean-Daniel Levi, Director-General of the Centre National d'Etudes Spatiales of France.

8. In accordance with paragraph 7 (b) (vii) of General Assembly resolution 46/45 of 9 December 1991, a symposium on the theme "Space technology and the Earth's environment" was organized by COSPAR and IAF in liaison with Member States as part of the special session. The symposium was co-chaired by Mr. George Ohring, Chairman of the COSPAR Commission on Space Studies of the Earth's Surface, Meteorology and Climate, and Mr. Dale Fester, Vice President, IAF. The presentations included: "Is the Earth Warming?" by Mr. Thomas R. Karl, Chief, Global Climate Laboratory, National Oceanic and Atmospheric Administration, United States; "Monitoring of Environmental Disasters from Weather Satellites" by Mr. Luo Jibin, Director, Satellite Meteorological Centre, China; "Novel Contributions by ERS-1 and SPOT to World Environmental and Climatological Issues" by Guy Duchossois, ESA ERS-1 Mission Manager; and "The ISY World Forest Watch: Implications for Developing Countries" by Mr. Roberto Da Cunha, Brazilian Institute for Space Research.

9. On 25 February, the Subcommittee adopted the following agenda:

1. Adoption of the agenda.

2. Statement by the Chairman.

3. General exchange of views.

4. United Nations Programme on Space Applications and the coordination of space activities within the United Nations system.

5. Implementation of the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space.

6. Matters relating to remote sensing of the Earth by satellites, including, inter alia, applications for developing countries.

7. Use of nuclear-power sources in outer space.

8. Questions relating to space transportation systems and their implications for future activities in space.

9. Examination of the physical nature and technical attributes of the geostationary orbit; examination of its utilization and applications, including, inter alia, in the field of space communications, as well as other questions relating to space communications developments, taking particular account of the needs and interests of developing countries.

10. Matters relating to life sciences, including space medicine.

11. Progress in national and international space activities related to the Earth environment, in particular progress in the geosphere-biosphere (global change) programme.

12. Matters relating to planetary exploration.

13. Matters relating to astronomy.

14. The theme fixed for special attention at the 1992 session of the Scientific and Technical Subcommittee: "Space technology and the protection of the Earth's environment: development of endogenous capabilities, in particular in the developing countries and in the context of International Space Year".

15. Other matters.

16. Report to the Committee on the Peaceful Uses of Outer Space.

Meetings and documentation

10. The Subcommittee held 14 meetings. In addition, two meetings were held on 24 February 1992 as part of the special session to celebrate International Space Year.

11. A list of the documents which were before the Subcommittee is provided in annex I to the present report.

12. Following the adoption of the agenda, the Chairman made a statement outlining the work of the Subcommittee at its current session. He also reviewed the activities of Member States in the field of space exploration, including important advances that had been achieved as a result of international cooperation during the past year.

13. At the 403rd, 405th and 407th meetings, the Chairman informed the Subcommittee that requests had been received from the Permanent Representatives of Cuba, Greece, Peru, Spain, Yemen and the Libyan Arab Jamahiriya, as well as from the Permanent Observer for the Holy See, to attend the session. Following past practice, those delegations were invited to attend the current session of the Subcommittee and to address it as appropriate. This was without prejudice to further requests of that nature and did not involve any decision of the Subcommittee concerning status, but was a courtesy that the Subcommittee extended to those delegations.

14. General statements were made by the following delegations: Argentina, Austria, Brazil, Bulgaria, Canada, China, Cuba, Czechoslovakia, Egypt, Germany, Hungary, India, Indonesia, Iran (Islamic Republic of), Mexico, Nigeria, Pakistan, Poland, Romania, Russian Federation, Sweden, Turkey, United States of America and Uruguay. Statements were also made by the representatives of COSPAR, IAF, WMO, FAO, ISPRS and INTELSAT.

15. At the 403rd meeting, the Chief of the Outer Space Affairs Division made a statement reviewing the work programme of the Division. At the 405th meeting, the Expert on Space Applications made a statement outlining the activities carried out and planned under the United Nations Programme on Space Applications.

Technical presentations

16. During the course of the session, scientific and technical presentations were made by Professor Nejat Ince, President of the Turkish Space Committee, on "Alternatives to geostationary orbits"; by the astronauts Dr. Norman Thagard (United States), Dr. Roberta Bondar (Canada) and Dr. Ulf Merbold (ESA) on the International Microgravity Laboratory mission; by Dr. Thomas Carroll, Director of the National Hydrology Remote Sensing Center, Office of Hydrology, United States National Weather Service, on "Remote Sensing Technology Used in Hydrology"; by Dr. M. G. Chandrasekhar, Scientific Secretary of the Indian Space Research Organization (ISRO), on "Remote Sensing for Sustainable Village Development in India"; by Ms. M. C. Durand, Canadian Space Agency, on "The Global Change Encyclopaedia"; by Dr. Arnauld Nicogossian, Director, Life Sciences Division, United States National Aeronautics and Space Administration (NASA), on space life science research; by Dr. Carl Pilcher, Chief, Advanced Study Branch, Solar System Exploration Division, NASA, on space exploration; by Dr. Jeffrey Bennett, Assistant for Education, Astrophysics Division, NASA, on "Mission to the Universe"; and by Dr. M. G. Chandrasekhar on space debris.

Recommendations of the Scientific and Technical Subcommittee

17. After considering the various items before it, the Subcommittee, at its 416th meeting, on 5 March 1992, adopted its report to the Committee on the Peaceful Uses of Outer Space containing its views and recommendations as set out in the paragraphs below.

I. UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS AND THE COORDINATION OF SPACE ACTIVITIES WITHIN THE UNITED NATIONS SYSTEM

II. IMPLEMENTATION OF THE RECOMMENDATIONS OF THE SECOND UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

18. In accordance with General Assembly resolution 46/45, the Subcommittee continued its consideration of these items. In accordance with past practice, the Subcommittee considered the two items jointly.

19. The Subcommittee noted that the General Assembly, in paragraph 13 of resolution 46/45, had once again emphasized the urgency and importance of implementing fully the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82) as early as possible. The Subcommittee also took note of paragraph 8 of the same resolution, in which the General Assembly had stated that, in the context of the Subcommittee's consideration of the item, it was particularly urgent to implement the following recommendations:

> "(a) All countries should have the opportunity to use the techniques resulting from medical studies in space;
>
> "(b) Data banks at the national and regional levels should be strengthened and expanded and an international space information service should be established to function as a centre of coordination;
>
> "(c) The United Nations should support the creation of adequate training centres at the regional level, linked, whenever possible, to institutions implementing space programmes; necessary funding for the development of such centres should be made available through financial institutions;
>
> "(d) The United Nations should organize a fellowship programme through which selected graduates or postgraduates from developing countries should get in-depth, long-term exposure to space technology or applications; it is also desirable to encourage the availability of opportunities for such exposure on other bilateral and multilateral bases outside the United Nations system."

20. In response to the recommendations of the Working Group of the Whole to Evaluate the Implementation of the Recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space contained in its report on the work of its fifth session, held in 1991 (A/AC.105/483, annex II, paras. 4, 5 and 6), which were endorsed by the General Assembly in paragraph 10 of resolution 46/45, the Subcommittee had before it the following documents: a report on international cooperation in the peaceful uses of outer space: activities of Member States (A/AC.105/505), containing information submitted by Member States in response to paragraphs 4 (b) and 4 (h) of the report of the Working Group; a study on applications of space technology to integrated land and water resources management for rural development (A/AC.105/490), in response to paragraph 6 (b) (i); a review of the applications of space technology to the study of desertification in developing countries (A/AC.105/501), in response to paragraph 6 (b) (iv); and a report on the implementation of the recommendations of UNISPACE 82 (A/AC.105/504), in response to paragraph 5. In addition, the Subcommittee had before it annual reports, including information in response to paragraph 4 (c), submitted by the following international organizations: the European Space Agency (A/AC.105/506), the World Meteorological Organization (A/AC.105/507), INTELSAT (A/AC.105/508), the European Telecommunications Satellite Organization (EUTELSAT) (A/AC.105/509), the Council on International Cooperation in the Study and Utilization of Outer Space (INTERCOSMOS) (A/AC.105/511), the International Maritime Satellite Organization (INMARSAT) (A/AC.105/512) and the International Telecommunication Union (ITU).

21. In accordance with paragraph 9 of General Assembly resolution 46/45, the Subcommittee reconvened the Working Group of the Whole with a view to improving the execution of activities relating to international cooperation, particularly those included in the United Nations Programme on Space Applications, and to proposing concrete steps to increase such cooperation as well as to make it more efficient. The Working Group was chaired by Mr. Muhammad Nasim Shah (Pakistan); it held four meetings between 27 February and 5 March 1992 and adopted its report (A/AC.105/C.1/WG.6/L.7) on 5 March 1992.

22. Having considered the report of the Working Group of the Whole, the Subcommittee decided at its 416th meeting, on 5 March 1992, to adopt that report, as contained in annex II to the present report, on the understanding that the recommendations contained therein would be carried out in accordance with paragraph 9 of General Assembly resolution 37/90 of 10 December 1982. The Subcommittee recommended that the Working Group be reconvened the next year to continue its work.

A. United Nations Programme on Space Applications

23. Regarding the expanded United Nations Programme on Space Applications, the Subcommittee had before it the report of the United Nations Expert on Space Applications (A/AC.105/497). The report was supplemented by the statement by the Expert. The Subcommittee noted that the Programme on Space Applications for 1991 had been carried out satisfactorily and commended the

work accomplished by the Expert in carrying out the work programme as endorsed by the Subcommittee at its last session.

24. The Subcommittee noted with appreciation that since its last session additional contributions had been offered by various Member States and organizations and that they had been acknowledged with appreciation in paragraph 42 of the Expert's report.

25. In this connection, the Subcommittee continued to express its concern over the limited financial resources available for carrying out the Programme and appealed to Member States to support the Programme through voluntary contributions. The Subcommittee felt that the limited resources of the United Nations should be focused on the highest priority activities and noted that the Programme on Space Applications was the priority activity of the Outer Space Affairs Division.

1. 1991-1992

(a) Long-range fellowships for in-depth training

26. The Subcommittee expressed its appreciation to the Governments of Austria, Brazil, China and the Russian Federation as well as to ESA for having offered training fellowships for the period 1991-1992, as shown in annex II to the Expert's report (A/AC.105/497). The Subcommittee noted with appreciation that the offers of fellowships were to be continued for 1992-1993 by Austria, Brazil and China as well as by ESA, as indicated by the Expert in his report.

27. The Subcommittee noted that it was important to increase the opportunities for in-depth education in all areas of space science, technology and applications through long-term fellowships.

(b) Technical advisory services

28. The Subcommittee took note of the technical advisory services being provided by the Outer Space Affairs Division in support of regional space applications projects, as indicated in the report of the Expert:

(a) Collaboration with ESA on a survey and field review of projects that could benefit from remote-sensing data being made available by ESA to African countries covered by ESA's two remote-sensing ground receiving stations at Maspalomas, Canary Islands, Spain and Fucino, Italy;

(b) Assistance to the Government of Ecuador in promoting regional use of the remote-sensing ground receiving station at Cotopaxi, Ecuador;

(c) Assistance to the Government of Chile for the preparations of the Second Space Conference of the Americas.

(c) United Nations workshops and training courses

29. With regard to the activities of the Programme carried out in 1991, the Subcommittee expressed its appreciation to:

(a) The Government of India for co-sponsoring the United Nations/ESA Workshop on Basic Space Science for Development, hosted by the Indian Space Research Organization at Bangalore, India, from 30 April to 3 May 1991;

(b) The Government of Spain, as well as FAO and ESA, for co-sponsoring the United Nations/FAO/ESA Workshop on Microwave Remote Sensing Technology, hosted by the Instituto Nacional de Técnica Aeroespacial (INTA) at the Maspalomas Space Station, Canary Islands, Spain, from 10 to 14 June 1991;

(c) The Government of China, as well as ESCAP and the Office of the United Nations Disaster Relief Coordinator (UNDRO), for co-sponsoring the United Nations/ESCAP/UNDRO Workshop on the Application of Space Techniques to Combat Natural Disasters, hosted by the State Science and Technology Commission of China at Beijing from 23 to 27 September 1991;

(d) The Government of the United States for co-sponsoring the International Training Course on Remote Sensing Applications for Environmental Assessment and Monitoring, hosted and financially supported by the United States Geological Survey at Sioux Falls, South Dakota, from 9 September to 4 October 1991;

(e) The Government of Germany, as well as ESA and the Carl Duisberg Society, Berlin, for co-sponsoring the Third United Nations International Training Course on Remote Sensing Applications to Geological Sciences, hosted by the Central Institute of the Physics of the Earth, Potsdam, and the Free University of Berlin from 7 to 25 October 1991;

(f) The Government of Peru, as well as WMO and ESA, for co-sponsoring the Sixth United Nations/WMO/ESA Training Course on the Use of Visible, Infrared and Radar Sensor Systems in Hydrological and Agrometeorological Applications, hosted by the Comisión Nacional de Investigación y Desarrollo Aeroespacial at Lima from 7 to 25 October 1991.

30. The Subcommittee also noted that the United Nations, through the Programme on Space Applications, had co-sponsored and financially supported the United Nations/ECA/FAO/United Nations Environment Programme (UNEP) Regional Workshop on Remote Sensing and Geographic Information Systems for African Decision-Makers, organized in cooperation with the Government of Kenya and held at Nairobi from 26 to 30 August 1991.

31. The Subcommittee took note of the status of the 1992 programme of United Nations workshops, training courses and conferences, which included the following activities, as described in paragraph 28 of the Expert's report:

(a) A United Nations Workshop on Space Technology for Resource Development and Environment Management, to be organized in cooperation with

the Governments of Ecuador and Japan for the benefit of States members of the Economic Commission for Latin America and the Caribbean (ECLAC) and to be held at Quito from 9 to 13 March 1992;

(b) The Second United Nations/Sweden Training Course on Remote Sensing Education for Educators, to be organized in cooperation with the Government of Sweden and held at Stockholm and Kiruna, Sweden, from 11 May to 12 June 1992;

(c) A United Nations/ESA/Planetary Society Workshop on Basic Space Science for Development, to be organized in cooperation with the Government of Costa Rica and held at San José in July 1992;

(d) A United Nations International Conference on Satellite Remote Sensing for Resource Management, Environmental Assessment and Global Change Studies, to be organized in cooperation with the Government of the United States and held at Boulder, Colorado, from 17 to 21 August 1992;

(e) The Seventh United Nations/FAO/WMO/ESA Training Course on the Use of Visible, Infrared and Radar Systems in Hydrological and Agrometeorological Applications, to be organized for the benefit of States members of ECA and the Economic and Social Commission for Western Asia (ESCWA) and held at the Regional Centre for Services in Surveying, Mapping and Remote Sensing (RCSSMRS) at Nairobi in September/October 1992;

(f) The Fourth United Nations Training Course on Remote Sensing Applications to Geological Sciences, to be organized in cooperation with the Government of Germany and the Carl Duisberg Society, Berlin, and hosted by the Central Institute for Physics of the Earth, Potsdam, and the Free University of Berlin in October 1992;

(g) A United Nations Conference on Communications Technology for Development, to be organized for the benefit of ESCAP member States in November 1992.

(d) Promotion of greater cooperation in space science and technology

32. The Subcommittee noted that, in conjunction with the 42nd IAF Congress held at Montreal, Canada, from 6 to 11 October 1991, the United Nations, through the Programme on Space Applications and in cooperation with the Government of Canada and IAF, had organized a pre-Congress Workshop on Space Technologies for Development from 2 to 5 October 1991, and that during the IAF Congress, the United Nations and IAF had co-sponsored a Special Session on Space Technology for Agricultural Management. The Subcommittee also noted that the United Nations had supported the participation of an expert from Argentina in the Fifth Symposium of the Society of Latin American Specialists in Remote Sensing, held at Cuzco, Peru, from 28 October to 1 November 1991.

33. The Subcommittee further noted that in 1992 the United Nations, through the Programme on Space Applications, would co-sponsor the following activities: a United Nations/COSPAR/IAF/American Institute for Aeronautics

and Astronautics (AIAA) Symposium on Space Technologies in Developing Countries - Making It Happen, to be held in Washington from 28 to 30 August in conjunction with the World Space Congress; special presentations during the World Space Congress on space education, communication, disaster management, remote sensing and space science in developing countries; a United Nations/ISPRS Workshop on Data Analysis, Methods and Applications, to be held in Washington on 6 and 7 August in conjunction with the 17th Congress of ISPRS; and a regional seminar sponsored and financially supported by the Government of the Islamic Republic of Iran on Remote Sensing of the Environment and Earth Resources to be held at Tehran from 16 to 22 September.

2. 1993

United Nations workshops, training courses, seminars and conferences

34. The Subcommittee recommended the approval of the following programme of workshops, training courses, seminars and conferences proposed for 1993:

(a) United Nations Seminar on Communications for Development, for the benefit of countries in the Mediterranean and adjacent areas, to be held at Athens;

(b) United Nations Workshop on the Use of Space Techniques for Monitoring and Control of the Desert Environment, for the benefit of ESCWA member States;

(c) United Nations Regional Conference on Space Technology for Sustainable Development, for the benefit of ESCAP member States, to be held at Jakarta;

(d) International Training Course on Communications Technology for Devlopment;

(e) Regional Training Course on Communications Technology for Development;

(f) United Nations/ECA Space Conference on Africa: Addressing Africa's Management Needs;

(g) United Nations Regional Workshop on Basic Space Science in Development Programmes, for the benefit of ECA member States;

(h) United Nations/UNDRO Regional Workshop on Space Technology to Combat Natural Disasters, for the benefit of member States in the ECLAC region, to be held in Mexico;

(i) United Nations/Indian Ocean Marine Affairs Cooperation (IOMAC) Workshop on Space Technology and Applications for Marine Resources, for the benefit of Member States in the Indian Ocean region.

B. International space information service

35. The Subcommittee noted with satisfaction that the Outer Space Affairs Division was in the process of developing an international space information system, including both information within the United Nations system and access to external databases.

36. The Subcommittee noted with satisfaction the publication of the document entitled "Seminars of the United Nations Programme on Space Applications: Selected Papers on Remote Sensing, Satellite Communications and Space Science" (A/AC.105/492). It also noted that the Secretariat was preparing updated editions of the Directory on Education, Training, Research and Fellowship Opportunities in Space Science and Technology and its Applications (A/AC.105/432), the Directory of Information Systems on Space Science and Technology (A/AC.105/397/Rev.1 and Add.1) and Space Activities of the United Nations and International Organizations (A/AC.105/358) for publication during International Space Year.

C. Reports

37. The Subcommittee noted with appreciation the reports submitted to it in response to the recommendations of the Working Group of the Whole in its report on the work of its fifth session (A/AC.105/483, annex II, paras. 4, 5 and 6). It noted in particular the technical studies prepared by the Secretariat on space applications for integrated land and water resources management for rural development (A/AC.105/490) and the review of applications of space technology to the study of desertification in developing countries (A/AC.105/501).

D. Coordination of space activities within the United Nations system and inter-agency cooperation

38. The Subcommittee noted that the General Assembly, in resolution 46/45, had reaffirmed its request that all organs, organizations and bodies of the United Nations system and other intergovernmental organizations working in the field of outer space or on space-related matters should cooperate in the implementation of the recommendations of UNISPACE 82.

39. The Subcommittee noted with satisfaction that the Inter-Agency Meeting on Outer Space Activities had been convened by the Administrative Committee on Coordination (ACC) at Geneva and hosted by UNDRO from 18 to 20 September 1991 and that its report (ACC/1991/PG/12) was before the Subcommittee. The Subcommittee took note of the information provided on the progress achieved in coordinating the space activities of the organizations of the United Nations system and expressed its appreciation for the report of the Secretary-General entitled "Coordination of outer space activities within the United Nations system: programmes of work for 1992 and 1993 and future years" (A/AC.105/491).

40. The Subcommittee continued to stress the necessity of ensuring continuous and effective consultations and coordination in the field of outer space activities among organizations within the United Nations system and the avoidance of duplication of activities.

E. Regional and interregional mechanisms of cooperation

41. The Subcommittee noted that the General Assembly, in its resolution 46/45, had reaffirmed its approval of the recommendation of UNISPACE 82 regarding the establishment and strengthening of regional mechanisms of cooperation and their promotion and creation through the United Nations system. The Subcommittee noted with satisfaction that, in carrying out various activities in the implementation of the recommendations of UNISPACE 82, the Secretariat had sought to strengthen those mechanisms.

42. The Subcommittee noted with appreciation the efforts undertaken as part of the United Nations Programme on Space Applications, in accordance with the UNISPACE 82 recommendation concerning the development of indigenous capabilities, to establish regional centres for space science and technology education in existing national or regional educational institutions in developing countries, as outlined in the report entitled "Centres for Space Science and Technology - a progress report" (A/AC.105/498). The Subcommittee noted with appreciation the offers by a number of Member States to host a regional centre and urged other Member States to support the centres. The Subcommittee requested the Outer Space Affairs Division to make every possible effort to obtain the support of other relevant international organizations and requested that it be kept informed of further developments on the subject.

43. The Subcommittee took note of the contributions made by other international organizations towards the promotion of international cooperation in space activities: FAO was continuing its activities relating to remote sensing of renewable natural resources, including training courses, support of development projects and monitoring of environmental conditions for the FAO Early Warning System on Food and Agriculture; ITU was continuing its work in the international coordination of space communications, including planning the 1992 World Administrative Radio Conference, providing technical assistance to developing countries and assisting in the development of the Regional African Satellite Communication System (RASCOM); WMO was continuing international cooperative programmes using space technology, including the World Weather Watch and the Tropical Cyclone Programme; INMARSAT was continuing to develop its satellite communication system for maritime, land-mobile and aeronautical communications, including the development of small, low-cost terminals and the provision of technical assistance and training; INTELSAT was further developing its system for international satellite communications, including its programmes for training and technical assistance; ESA was continuing its programme of international cooperative space activities, including training programmes for the benefit of developing countries, support of the activities of the United Nations Programme on Space Applications and technical assistance projects.

44. The Subcommittee took note of the Agreement on Joint Activities in the Study and Utilization of Outer Space signed by the members of the Commonwealth of Independent States and submitted to the Subcommittee by the Russian Federation (A/AC.105/C.1/L.179). The Subcommittee noted with appreciation the support provided to the United Nations Programme on Space Applications by the former Soviet Union and expressed the hope that such support would be continued by the States members of the Commonwealth of Independent States.

45. The Subcommittee emphasized the importance of regional and international cooperation in making the benefits of space technology available to all countries, through such cooperative activities as shared payloads, dissemination of information on spin-off benefits, ensuring compatibility of space systems and providing access to launch capabilities at reasonable cost.

III. MATTERS RELATING TO REMOTE SENSING OF THE EARTH BY SATELLITES INCLUDING, INTER ALIA, APPLICATIONS FOR DEVELOPING COUNTRIES

46. In accordance with General Assembly resolution 46/45, the Subcommittee continued its consideration of this item.

47. In the course of the debate, delegations reviewed the national and cooperative programmes in remote sensing. Examples were given of national programmes in developing and developed countries and of international programmes based on bilateral, regional and international cooperation, including programmes of technical cooperation between developing countries. Countries with advanced capabilities in the field, including some developing countries, described programmes to provide assistance to other developing countries.

48. The Subcommittee took note of the continuing programmes of China, France, India, Japan, the Russian Federation, the United States and ESA for remote-sensing satellites as well as the planned remote-sensing satellite systems of Brazil and Canada. It also took note of the remote-sensing activities of FAO for mapping, assessment and management of renewable natural resources for the benefit of developing countries and of UNESCO in the area of education and training in remote sensing, particularly for oceanography. The Subcommittee heard special presentations on remote sensing by experts from Canada, India and the United States, as mentioned in paragraph 16 of the present report.

49. The Subcommittee reiterated its view that remote-sensing activities should take into account the need to provide appropriate and non-discriminatory assistance to meet the needs of the developing countries.

50. The Subcommittee emphasized the importance of making remote-sensing data and analysed information openly available to all countries at reasonable cost and in a timely manner. The Subcommittee also recognized the need for continuing free access to data from operational meteorological satellites.

51. The Subcommittee felt that international cooperation in the use of remote-sensing satellites should be encouraged, both through coordination of the operations of ground stations and through regular meetings between satellite operators and users. It noted the importance of compatibility and complementarity of existing and future remote-sensing systems. The Subcommittee also noted the importance, particularly for the developing countries, of sharing experiences and technologies, of cooperation through international and regional remote-sensing centres and of joint work on collaborative projects.

52. Recalling General Assembly resolution 41/65 of 3 December 1986, by which the Assembly had adopted the Principles Relating to Remote Sensing of the Earth from Outer Space, the Subcommittee recommended that at its thirtieth session it continue its discussion on remote-sensing activities conducted in accordance with those principles, during its consideration of the agenda item concerning remote sensing.

53. The Subcommittee recommended that the item be retained on its agenda as a priority item for the next session.

IV. USE OF NUCLEAR-POWER SOURCES IN OUTER SPACE

54. In accordance with General Assembly resolution 46/45, the Subcommittee continued its consideration of this item.

55. In accordance with General Assembly resolution 46/45, the Working Group on the Use of Nuclear Power Sources in Outer Space was reconvened to resume its work at the current session. The Working Group met from 26 February to 5 March under the chairmanship of Professor J. H. Carver (Australia). At a meeting held on 5 March 1992, the Working Group adopted its report (A/AC.105/C.1/WG.5/L.30).

56. At its 416th meeting, on 5 March 1992, the Subcommittee adopted the report of the Working Group, which is contained in annex III to the present report.

57. The Subcommittee agreed that Member States should be invited to report to the Secretary-General on a regular basis with regard to national and international research concerning the safety of nuclear-powered satellites.

58. The Subcommittee agreed that further studies should be conducted on the problem of the collision of nuclear-power sources with space debris and that it should be kept informed of the results of such studies. The Subcommittee took note of a working paper submitted by the Russian Federation (A/AC.105/C.1/L.180) containing preliminary results of studies on the question.

59. The view was expressed that it would be desirable for IAEA to continue to provide technical views and expert services on issues on which it had relevant experience.

60. The Subcommittee noted that the delegations of Canada and Germany would prepare an eleventh revision of the draft principles contained in working paper A/AC.105/C.2/L.154 of 25 March 1986. In the view of these and some other delegations, the revised working paper would reflect discussions held at the current session of the Subcommittee and would provide the Legal Subcommittee with a document which would help it in meeting the aim set by the General Assembly at its 46th session, that the principles on nuclear-power sources be finalized at the next session of the Legal Subcommittee.

61. The Subcommittee recommended that the item be retained on its agenda for the next session.

62. The Subcommittee also recommended that the question of reconvening the Working Group on the Use of Nuclear Power Sources in Outer Space be considered by the Committee at its next session in the light of the work carried out by the Legal Subcommittee on the subject at its thirty-first session.

V. QUESTIONS RELATING TO SPACE TRANSPORTATION SYSTEMS AND THEIR IMPLICATIONS FOR FUTURE ACTIVITIES IN SPACE

63. In accordance with General Assembly resolution 46/45, the Subcommittee continued its consideration of this item.

64. In the course of the discussion, delegations reviewed the national and international cooperative programmes in space transportation systems, including expendable launchers, reusable space shuttles, space stations and research on aerospace planes. In particular, the Committee noted that China was continuing the use and development of its Long March series of launch vehicles; that India was continuing development of the Augmented Satellite Launch Vehicle and the Polar Satellite Launch Vehicle and had initiated development of a Geostationary Satellite Launch Vehicle; that Japan was continuing its development of the H-II and M-5 launch vehicles and conducting research on the H-II Orbiting Plane (HOPE); that the Russian Federation was continuing the space transportation programme of the Soviet Union in cooperation with other countries of the Commonwealth of Independent States, including the use of expendable launchers of the Soyuz, Cosmos, Proton, Tsyklon and other series to place into orbit 85 space objects of various descriptions, and of the crewed Mir space station on which, since 1986, nine basic and seven international crews had been working; that the United Kingdom was studying, in cooperation with the Russian Federation, the air-launched, reusable HOTOL launch system; that the United States was continuing its programme of expendable launches and flights of the reusable Space Shuttle and was developing the Space Station Freedom in cooperation with Canada, Japan and ESA as well as conducting research for the National Aerospace Plane; and that ESA was continuing development of the Ariane series of launch vehicles and the crewed Hermes space plane. The Subcommittee heard a special presentation by astronauts from Canada, the United States and the European Space Agency on the International Microgravity Laboratory Mission, as mentioned in paragraph 16 of the present report.

65. The Subcommittee stressed the importance of international cooperation in space transportation in order to provide all countries with access to the benefits of space science and technology.

66. The Subcommittee recommended that consideration of the item be continued at its next session.

VI. EXAMINATION OF THE PHYSICAL NATURE AND TECHNICAL ATTRIBUTES OF THE GEOSTATIONARY ORBIT; EXAMINATION OF ITS UTILIZATION AND APPLICATIONS, INCLUDING, INTER ALIA, IN THE FIELD OF SPACE COMMUNICATIONS, AS WELL AS OTHER QUESTIONS RELATING TO SPACE COMMUNICATIONS DEVELOPMENTS, TAKING PARTICULAR ACCOUNT OF THE NEEDS AND INTERESTS OF DEVELOPING COUNTRIES

67. In accordance with General Assembly resolution 46/45, the Subcommittee continued its consideration of this item.

68. In the course of the discussion, delegations reviewed national and international cooperative programmes in satellite communications, including progress in communications satellite technology that would make satellite communications more accessible and less expensive and increase the communications capacity of the geostationary orbit and the electromagnetic spectrum. The Subcommittee took note of studies and research on the use of multiple, low-orbiting satellites for low-cost satellite communications. The Subcommittee heard a special presentation on alternatives to the geostationary orbit for satellite communications, as mentioned in paragraph 16 of the present report.

69. Some delegations expressed the view that the geostationary orbit was a limited natural resource and that saturation should be avoided in order to ensure that all countries had non-discriminatory access to the orbit. Those delegations felt that a special regime was required to ensure equitable access by all States, particularly developing countries. They felt that the roles of ITU and the Committee on the Peaceful Uses of Outer Space with respect to the geostationary orbit were complementary. Other delegations expressed the view that questions relating to the geostationary orbit were being addressed effectively in ITU.

70. Some delegations expressed the view that in considering the question of equitable access, account should be taken in particular of the characteristics of the equatorial countries.

71. Some delegations noted that the use of the geostationary orbit, like other orbits, was affected by the problem of space debris and that efforts were needed to minimize the generation of debris in the orbit and to move satellites shortly before the end of their useful lives into disposal orbits beyond the geostationary belt of orbits.

72. The Subcommittee recommended that consideration of the item be continued at its next session.

VII. MATTERS RELATING TO LIFE SCIENCES, INCLUDING SPACE MEDICINE

73. In accordance with General Assembly resolution 46/45, the Subcommittee continued its consideration of this item. The Subcommittee heard a special presentation on the question by an expert from the United States, as mentioned in paragraph 16 of the present report. The Subcommittee took note of a working paper submitted by the Russian Federation (A/AC.105/C.1/L.182).

74. The Subcommittee noted with appreciation the study prepared at its request by the Secretariat on applications of biomedical technology resulting from space life-science research (A/AC.105/500).

75. The Subcommittee took note of the programmes of space life-science research in Canada, Germany, the Russian Federation and the United States. The Subcommittee noted that studies of human physiology under the microgravity conditions of space flight had led to important advances in medical knowledge in such areas as blood circulation, the vestibular apparatus, physiology, biomechanics and metabolism. It noted that important new information in these fields had been obtained through experiments on board the Mir space station and during the Spacelab Life Sciences mission and the International Microgravity Laboratory mission. The Subcommittee also noted that products of space biotechnology, such as pharmaceuticals and diagnostic and therapeutic instruments, could contribute to improved health care on Earth.

76. The Subcommittee noted that applications of space technologies were demonstrating growing promise in medicine and public health. Satellite remote sensing was being used for the prediction of the spread of vector-borne diseases such as malaria and for the planning of more effective vector control campaigns. Satellite communications were being used for telemedicine services to provide expert medical advice to distant areas, as illustrated by the Telemedicine Spacebridge linking medical centres in the United States and the Soviet Union. The Subcommittee noted the importance of space technology for these purposes and encouraged further research and exchange of information on those applications.

77. The Subcommittee noted that space studies in life sciences and medicine had important potential benefits for all countries and that efforts should be made to promote international cooperation to enable all countries to benefit from those advances. In this connection, the Subcommittee recalled that the General Assembly, in resolution 46/45, had considered it particularly important that all countries should have the opportunity to use the techniques resulting from medical studies in space.

78. The Subcommittee recommended that consideration of the item be continued at its next session.

VIII. PROGRESS IN NATIONAL AND INTERNATIONAL SPACE ACTIVITIES RELATED TO THE EARTH ENVIRONMENT, IN PARTICULAR PROGRESS IN THE GEOSPHERE-BIOSPHERE (GLOBAL CHANGE) PROGRAMME

IX. THE THEME FIXED FOR SPECIAL ATTENTION AT THE 1992 SESSION: "SPACE TECHNOLOGY AND THE PROTECTION OF THE EARTH'S ENVIRONMENT: DEVELOPMENT OF ENDOGENOUS CAPABILITIES, IN PARTICULAR IN THE DEVELOPING COUNTRIES AND IN THE CONTEXT OF INTERNATIONAL SPACE YEAR"

79. In accordance with General Assembly resolution 46/45, the Subcommittee continued its consideration of the item concerning progress in national and international space activities related to the Earth environment, in particular progress in the International Geosphere-Biosphere (Global Change) Programme.

80. In accordance with General Assembly resolution 46/45, the Subcommittee paid special attention to the theme "space technology and the protection of the Earth's environment: development of endogenous capabilities, in particular in the developing countries and in the context of international space year". The Subcommittee noted with satisfaction that, at its invitation and as part of the special session for International Space Year, COSPAR and IAF had organized a symposium on the theme on 24 February 1991. The Subcommittee expressed appreciation to COSPAR and IAF for the very instructive symposium.

81. The Subcommittee also noted the contacts between the Outer Space Affairs Division and the secretariat for the United Nations Conference on Environment and Development. The Subcommittee recommended that the Outer Space Affairs Division continue contacts and cooperation with the secretariat of the Conference, particularly in the light of the fact that the Conference would be held in 1992.

82. The Subcommittee noted the progress being made through international cooperation in the International Geosphere-Biosphere Programme, with the participation of many countries. It noted that such a joint international effort was of fundamental importance for examining the future habitability of the planet and for managing the common natural resources of the Earth. The Subcommittee took particular note of the need to involve as many nations as possible in the scientific activities of the Programme, both in developed and in developing countries.

83. The Subcommittee noted the great importance of the implementation of the Russian Federation/United States Total Ozone Mapping System project to study the ozone layer.

84. The Subcommittee took note of the important contributions of satellite remote sensing for monitoring, preventing and reversing land degradation, for planning the sustainable development of rural areas, for water conservation, for monitoring crop conditions and for predicting and assessing drought. It noted that the recent launches of the European Remote Sensing (ERS-1)

satellite, the Japanese Earth Resources Satellite (JERS-1) and the Almaz satellite would provide valuable microwave data to complement the multispectral data from satellites of the Landsat, Resurs, SPOT, Indian Remote Sensing (IRS) and Marine Observation Satellite (MOS) series.

85. The Subcommittee noted the important contribution of meteorological and atmospheric research satellites for studying global climate change, including the greenhouse effect and the degradation of the ozone layer. The recent launches of the Upper Atmosphere Research Satellite and the Meteor satellite carrying the Total Ozone Mapping System have provided important new tools for this purpose.

86. The Subcommittee noted the need for further space research relating to climate change, sea-level change, vegetation cover, erosion, flood and earthquake prediction and relief, and other factors related to the Earth environment. The Subcommittee recognized the important contribution that satellite remote sensing and meteorology could make to the study of those dynamic environmental phenomena.

87. The Subcommittee took note of activities being planned for the study of the environment from space, including the Mission to Planet Earth programme. It noted, in particular, plans for the Earth Observing System, the Priroda ecological module and the TOPEX/Poseidon oceanographic satellite.

88. The Subcommittee noted the potential benefits of the use of space technology for monitoring the tectonic activity of the Earth for earthquake prediction. It noted the importance of further research in that area.

89. The Subcommittee noted the importance of international cooperation in the various existing and planned satellite systems for environmental monitoring. It recommended that other States consider participating in such cooperative activities.

90. The Subcommittee recommended that consideration of the item be continued at its next session.

X. MATTERS RELATING TO PLANETARY EXPLORATION

XI. MATTERS RELATING TO ASTRONOMY

91. In accordance with General Assembly resolution 46/45, the Subcommittee continued its consideration of these items. The Subcommittee heard special presentations on the items by experts from the United States, as mentioned in paragraph 16 of the present report.

92. The Subcommittee noted that three planetary exploration missions were currently under way. The Magellan spacecraft was in orbit around Venus and was conducting a systematic radar mapping programme of that planet. The Galileo spacecraft was on a complex trajectory to Jupiter and had recently

made the first close observations of an asteroid. The Ulysses spacecraft had successfully made a swing-by manoeuvre of Jupiter on its long trajectory to observe the polar regions of the Sun. The Subcommittee also noted the plans for future spacecraft to conduct comprehensive investigations of Mars and Saturn and its moons. The Subcommittee noted the high degree of international cooperation in all of those investigations and stressed the need to further enhance international cooperation in the field, to enable all countries to benefit from and participate in those activities.

93. The Subcommittee noted that the use of spacecraft for making astronomical observations from above the atmosphere had greatly advanced knowledge of the universe by allowing observations in all regions of the electromagnetic spectrum. It noted that with the Hubble Space Telescope, the Rosat X-ray observatory, the Gamma and Granat astrophysical observatories, the Compton Gamma Ray Observatory and the Hipparcos spacecraft, astronomers had powerful new tools for their investigations of the universe. The planned launches of the Lyman Far Ultraviolet Spectroscopic Explorer (FUSE), the Radioastron satellite, the Spektr-Roentgen-Gamma observatory, the Advanced X-ray Astrophysical Facility, the Space Infra-Red Telescope Facility, the Infrared Space Observatory and the Extreme Ultraviolet Explorer would open up further realms of the universe to detailed observation. The Subcommittee noted with satisfaction that all of those projects were open to broad international cooperation.

94. The Subcommittee recommended that consideration of the items be continued at its next session.

XII. OTHER MATTERS

A. International Space Year - 1992

95. The Subcommittee noted that the General Assembly, in its resolution 46/45, had recommended that the Scientific and Technical Subcommittee, at its 1992 session, should dedicate at least one meeting to International Space Year. The Subcommittee expressed its appreciation to COSPAR and IAF for sponsoring and assisting in the organization of the special session on 24 February 1992 to celebrate International Space Year, as described in paragraphs 7 and 8 of the present report. The Subcommittee also expressed its appreciation to all those who had contributed to the special session.

96. The Subcommittee took note of the proposed programme for the participation of the United Nations in ISY (A/AC.105/445 and Add.1-7) and noted that a guidebook describing the programme had been distributed to Member States. The Subcommittee noted that the General Assembly, in its resolution 46/45, had urged Member States, international organizations and other funding sources to support the efforts of the United Nations in connection with International Space Year.

97. The Subcommittee noted that the participation of the United Nations in ISY was funded by voluntary contributions. The Subcommittee expressed its

appreciation to the Member States and international organizations that had made voluntary contributions for the purpose or were planning to do so. The Subcommittee urged other Member States and international organizations to further support scientific and technical activities in cooperation with the United Nations as part of International Space Year.

98. The Subcommittee noted that a focus of international ISY activities was the use of space technology for studying and monitoring the environment. It also noted that the General Assembly, in resolution 46/45, had reiterated its recommendation that Member States, in planning their activities for ISY, should consider ways in which those activities could complement the efforts under way for the United Nations Conference on Environment and Development, also planned for 1992. The Subcommittee noted the cooperation between the Outer Space Affairs Division and the Conference secretariat.

99. The Subcommittee noted the wide variety of national and international programmes being undertaken as part of International Space Year, including the activities being coordinated through the Space Agency Forum on International Space Year (SAFISY), COSPAR, IAF and ISPRS. It noted in particular the plans for the World Space Congress being organized jointly by COSPAR and IAF, including activities organized in cooperation with the United Nations. The Subcommittee also noted the importance of including all countries in those programmes and of planning activities that would continue beyond 1992. The Subcommittee heard a special presentation by an expert from Canada on the Global Change Encyclopaedia being prepared for ISY, as mentioned in paragraph 16 of the present report.

100. The Subcommittee requested the Secretariat to keep the Committee and the Subcommittee informed of further developments relating to this question.

B. Space and Earth environment

101. The Subcommittee noted that the General Assembly, in resolution 46/45, had recommended that more attention be paid to all aspects related to the protection and the preservation of the outer space environment, especially those potentially affecting the Earth's environment. The Subcommittee also noted that the General Assembly had considered that it was essential that Member States pay more attention to the problem of collisions with space debris and other aspects of space debris, and had called for the continuation of national research on the question and for the development of improved technology for the monitoring of space debris.

102. The Subcommittee noted that the General Assembly had considered that, to the extent possible, information relating to the question of space debris should be provided to the Subcommittee in order to allow it to follow the question more closely, and had requested the Secretary-General to invite Member States to provide information on their national research on space debris to the Subcommittee. The Subcommittee took note of the information that had been submitted by Member States in response to that request and that

was contained in document A/AC.105/510 and Add.1 to 3. The Subcommittee heard a special presentation on the subject by an expert from India, as mentioned in paragraph 16 of the present report.

103. The Subcommittee reaffirmed the importance of reducing the generation of space debris and that there was a need for further research concerning space debris, for the development of improved technology for monitoring space debris and for the compilation and dissemination of data on space debris. It further noted the importance of international cooperation in addressing those issues.

104. The Subcommittee noted that the General Assembly, in resolution 46/45, had considered that space debris could be an appropriate subject for in-depth discussion by the Committee on the Peaceful Uses of Outer Space in the future.

105. The Subcommittee agreed that information on national research on space debris should be provided to the Subcommittee, as in the past. This could be done through provision of working papers, interventions in the general debate and technical presentations by specialists from Member States and international organizations, in particular COSPAR and IAF.

106. Some delegations expressed the view that, considering that 1992 was International Space Year, the question of space debris should be included on the Subcommittee's agenda at its next session, allowing for a general exchange of views and information. Other delegations, while recognizing the importance of the subject, expressed the view that such consideration was premature until further national research on the problem of space debris had been undertaken.

107. The Subcommittee agreed that other matters related to the protection and preservation of the outer space environment should also be a subject of further research.

108. The Subcommittee took note of a working paper submitted by Poland (A/AC.105/C.1/L.181) calling for the preparation of a report on the preservation and protection of the outer space environment, especially activities potentially affecting the Earth environment, and proposing the establishment of a working group to prepare the report.

109. The Subcommittee took note of a working paper submitted by Czechoslovakia (A/AC.105/C.1/L.184) concerning a definition of space debris and a possible format for the discussions relating to space debris in the Committee on the Peaceful Uses of Outer Space and its subcommittees.

C. Other reports

110. The Subcommittee welcomed the annual reports of ESA (A/AC.105/506), WMO (A/AC.105/507), INTELSAT (A/AC.105/508), EUTELSAT (A/AC.105/509), INTERCOSMOS (A/AC.105/511) and INMARSAT (A/AC.105/512) and the preliminary version of the thirty-first report of ITU on telecommunication and the peaceful uses of outer space. The Subcommittee requested those organizations to continue to report on their work.

111. The Subcommittee expressed its appreciation to COSPAR for its report on the progress of space research during the period 1990-1991 (A/AC.105/502) and to IAF for its report on highlights in space technology and applications during 1991 (A/AC.105/503). The Subcommittee noted that those reports would be published jointly for dissemination to a wider audience, as suggested by the Subcommittee at its twenty-eighth session.

112. The Subcommittee noted with appreciation the participation in its session of representatives from United Nations bodies, specialized agencies and permanent observers, and found their statements and reports helpful in enabling the Subcommittee to fulfil its role as focal point for international cooperation in space.

D. Review of the future role and work of the Scientific and Technical Subcommittee

113. The Subcommittee recommended that the agenda of its thirtieth session include the following priority items:

(a) Consideration of the United Nations Programme on Space Applications and the coordination of space activities within the United Nations system;

(b) Implementation of the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82);

(c) Matters relating to remote sensing of the Earth by satellites including, inter alia, applications for developing countries;

(d) Use of nuclear-power sources in outer space.

114. The Subcommittee also recommended that the agenda of the thirtieth session include the following items:

(a) Questions relating to space transportation systems and their implications for future activities in space;

(b) Examination of the physical nature and technical attributes of the geostationary orbit; examination of its utilization and applications, including, inter alia, in the field of space communications, as well as other questions relating to space communications developments, taking particular account of the needs and interests of developing countries;

(c) Matters relating to life sciences, including space medicine;

(d) Progress in national and international space activities related to the Earth environment, in particular progress in the geosphere-biosphere (global change) programme;

(e) Matters relating to planetary exploration;

(f) Matters relating to astronomy;

(g) The theme fixed for special attention at the 1993 session of the Scientific and Technical Subcommittee: "Space-based communication: the expansion of current services and increased understanding of new systems and the services they will make possible".

115. The Subcommittee recommended that, regarding agenda item (g) in paragraph 114 above, COSPAR and IAF, in liaison with Member States, should be invited to arrange a symposium, with as wide a participation as possible, to be held during the first week of the Subcommittee's session, to complement discussions within the Subcommittee on the special theme.

116. With regard to the dates for the thirtieth session, the Subcommittee recommended that its session be scheduled from 16 to 26 February 1993.

Annex I

DOCUMENTS BEFORE THE SCIENTIFIC AND TECHNICAL SUBCOMMITTEE AT ITS TWENTY-NINTH SESSION

Item 1 - Adoption of the agenda

A/AC.105/C.1/L.178	Provisional agenda, with annotations, for the twenty-ninth session

Item 4 - United Nations Programme on Space Applications and the coordination of space activities within the United Nations system

Item 5 - Implementation of the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space

A/AC.105/489	Report on the United Nations/European Space Agency Workshop on Basic Space Science for Developing Countries, organized in cooperation with the Government of India and hosted by the Indian Space Research Organization, 30 April-3 May 1991, Bangalore, India
A/AC.105/491	Coordination of outer space activities within the United Nations system: programmes of work for 1992 and 1993 and future years: report of the Secretary-General
A/AC.105/492	Seminars of the United Nations Programme on Space Applications: selected papers on remote sensing, satellite communications and space science - 1992
A/AC.105/493	Report on the United Nations/Food and Agriculture Organization of the United Nations/European Space Agency Workshop on Microwave Remote Sensing Technology, organized in cooperation with the Government of Spain, 10-14 June 1991, Canary Islands, Spain
A/AC.105/494	Report on the United Nations/ESCAP/UNDRO Workshop on the Applications of Space Techniques to Combat Natural Disasters, organized in cooperation with the Government of China, 23-27 September 1991, Beijing

A/AC.105/495	Report on the Third United Nations International Training Course on Remote-Sensing Applications to Geological Sciences, co-sponsored by the Carl Duisberg Society Berlin and the European Space Agency in cooperation with the Government of Germany, 7-25 October 1991, Potsdam and Berlin, Germany
A/AC.105/496	Sixth United Nations/World Meteorological Organization/European Space Agency Training Course on the Use of Visible, Infrared and Microwave Sensor Systems in Hydrological and Agrometeorological Applications, organized in cooperation with the Government of Peru, 7-25 October 1991, Lima
A/AC.105/497 and Corr.1	Report of the United Nations Expert on Space Applications to the Scientific and Technical Subcommittee, February/March 1992
A/AC.105/498	Centres for Space Science and Technology Education - a progress report
A/AC.105/499	Report on the United Nations International Training Course on Remote-Sensing Applications for Environmental Assessment and Monitoring, co-sponsored and hosted by the Government of the United States of America, 9 September-4 October 1991, Sioux Falls, South Dakota
A/AC.105/504	See Working Group of the Whole to evaluate the implementation of UNISPACE 82, below
A/AC.105/C.1/L.179	Implementation of the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space: Agreement on joint activities in the study and utilization of outer space, signed on 30 December 1991 by the States members of the Commonwealth of Independent States
ACC/1991/PG/12	Report of the Ad Hoc Inter-Agency Meeting on Outer Space Activities, held at the Office of the United Nations Disaster Relief Coordinator, Geneva, 18-20 September 1991

Item 6 - Matters relating to remote sensing of the Earth by satellites including, inter alia, applications for developing countries

Item 14 - The theme fixed for special attention at the 1992 session of the Scientific and Technical Subcommittee: "Space technology and the protection of the Earth's environment: development of endogenous capabilities, in particular in the developing countries and in the context of International Space Year"

A/AC.105/490	See Working Group of the Whole to evaluate the implementation of UNISPACE 82, below

Item 7 - Use of nuclear-power sources in outer space

A/AC.105/C.1/L.180	Use of nuclear-power sources in outer space: working paper submitted by the Russian Federation
A/AC.105/C.1/WG.5/L.29	Use of nuclear-power sources in outer space: draft preamble to the principles relevant to the use of nuclear-power sources in outer space: working paper submitted by Australia, Canada, France, Germany, India, Turkey and the United Kingdom of Great Britain and Northern Ireland
A/AC.105/C.1/WG.5/L.30	Draft report of the Working Group on the Use of Nuclear Power Sources in Outer Space on the work of its ninth session

Item 10 - Matters relating to life sciences, including space medicine

A/AC.105/500	Applications of biomedical technology resulting from space life-science research: study by the Secretariat
A/AC.105/C.1/L.182	Space biology and medicine and their contribution to solving human health problems: results and prospects: working paper submitted by the Russian Federation

Item 11 - Progress in national and international space activities related to the Earth environment, in particular progress in the geosphere-biosphere (global change) programme

A/AC.105/501	See Working Group of the Whole to evaluate the implementation of UNISPACE 82, below

Item 15 - Other matters:

(a) Other reports

(b) Review of the future role and work of the Scientific and Technical Subcommittee

A/AC.105/445 and Add.5-7	Participation of the United Nations in International Space Year: note by the Secretariat
A/AC.105/502	Progress of space research 1990-1991: report submitted by the Committee on Space Research of the International Council of Scientific Unions
A/AC.105/503	Highlights in space technology and applications 1991: report submitted by the International Astronautical Federation (IAF)
A/AC.105/506	Report of the European Space Agency (ESA) (1990)
A/AC.105/507	WMO Tropical Cyclone Programme: Report by the World Meteorological Organization
A/AC.105/508	Report of the International Telecommunications Satellite Organization (INTELSAT)
A/AC.105/509	Report of the European Telecommunications Satellite Organization (EUTELSAT)
A/AC.105/510 and Add.1-3	National research on the question of space debris: note by the Secretariat
A/AC.105/511	The Council of International Cooperation in the Study and Utilization of Outer Space (INTERCOSMOS) annual review 1991
A/AC.105/512	International Maritime Satellite Organization (INMARSAT): annual review 1990
A/AC.105/C.1/L.181	Report on the protection and preservation of the outer space environment, especially activities potentially affecting the Earth environment: working paper submitted by Poland
A/AC.105/C.1/L.184	Space debris: working paper submitted by Czechoslovakia

Working Group of the Whole to Evaluate the Implementation of the Recommendations of UNISPACE 82

A/AC.105/490	The applications of space technology for integrated land and water resources management for rural development
A/AC.105/501	Applications of space technology to the study of desertification in developing countries: note by the Secretariat
A/AC.105/504	Report of the Secretariat in response to the request of the Working Group of the Whole to Evaluate the Implementation of the Recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space
A/AC.105/505 and Add.1	International cooperation in the peaceful uses of outer space - activities of Member States: note by the Secretariat
A/AC.105/C.1/WG.6/L.7	Draft report of the Working Group of the Whole to Evaluate the Implementation of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space on the work of its sixth session

Annex II

REPORT OF THE WORKING GROUP OF THE WHOLE TO EVALUATE THE IMPLEMENTATION OF THE RECOMMENDATIONS OF THE SECOND UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE ON THE WORK OF ITS SIXTH SESSION

1. The Working Group of the Whole to Evaluate the Implementation of the Recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82) was re-established for its sixth session by the Scientific and Technical Subcommittee in accordance with General Assembly resolution 46/45 of 9 December 1991, paragraph 9, with a view to improving the execution of activities relating to international cooperation, particularly those included in the United Nations Programme on Space Applications, and to proposing concrete steps to increase such cooperation as well as to make it more efficient. The Working Group held a series of meetings from 27 February to 4 March 1992, during the twenty-ninth session of the Scientific and Technical Subcommittee. At its meeting on 4 March 1992, the Working Group adopted the present report.

2. Mr. Muhammed Nasim Shah (Pakistan) was elected Chairman of the Working Group. The Chairman, in his opening statement, reviewed the mandate of the Working Group for its sixth session and the status of the implementation of the recommendations of UNISPACE 82.

3. In accordance with paragraph 9 of resolution 46/45, the Working Group of the Whole undertook a comprehensive assessment of the implementation of the recommendations of UNISPACE 82. While doing so, the Working Group had before it a background paper prepared by the Secretariat (A/AC.105/504), as well as a number of studies and reports prepared by Member States and international organizations. The Working Group noted that 1992 was the tenth anniversary of UNISPACE 82.

4. The Working Group noted with satisfaction the valuable efforts of the United Nations, Member States and other relevant international organizations to implement the recommendations of UNISPACE 82.

5. Bearing in mind that a number of the recommendations were yet to be implemented, the Working Group recommended that the following should be undertaken, keeping in view the priorities contained in paragraph 8 of General Assembly resolution 46/45.

I. SHORT-TERM TRAINING AND LONG-TERM EDUCATION

6. Seminars and workshops should continue to be organized regularly on advanced applications of space science and technology and on new systems developments. At the same time, the recent evolution of the related technologies, applications and developmental priorities should be taken into

account for the benefit of the planners, administrators and users in the developing countries. Member States, particularly the developed countries, and international organizations are requested to support the training programme on an ongoing basis.

7. The emphasis of the United Nations Programme on Space Applications should remain on long-term, project-oriented on-the-job training in space technology itself as well as its specific applications areas, in particular new developments in satellite systems, software for remote sensing and use of digital processing systems and training for management of ground stations. In order to facilitate the development by the developing countries of their indigenous research-and-development capabilities, the number of trainees from each country should be sufficient to create a national core group of experts. The Working Group noted with appreciation the offers of fellowships made by some Member States and international organizations in that regard and urged other Member States and international organizations to make similar contributions. Keeping in view that the UNISPACE 82 recommendations envisaged at least 100 fellowships to be organized by the United Nations annually for in-depth, long-term exposure to space technology and applications, the Outer Space Affairs Division should make every effort to arrange for the increase in number of fellowships and to encourage full utilization of the fellowships.

8. Member States are urged to introduce or to improve space-related materials in the curricula of their existing universities at both undergraduate and graduate levels to promote education in space science, technology and applications.

II. INTERNATIONAL COOPERATION

9. The Working Group noted with appreciation the efforts being made by the United Nations in connection with the creation of centres for space science and technology education at the regional level, possibly linked to the institutions implementing space programmes in the developing countries. The Working Group also noted that the documents had been distributed to the Member States in this regard, giving details of the establishment of the centres. Bearing in mind the recommendations of UNISPACE 82, the United Nations should continue making efforts to arrange funding and other support from the developed countries as well as from international organizations for this purpose.

10. In the light of the continued development and evolution of space activities, the Committee on the Peaceful Uses of Outer Space should request all States, particularly those with major space or space-related capabilities, to continue to inform the Secretary-General annually, as appropriate, about those space activities that were or could be the subject of greater international cooperation, with particular emphasis on the needs of the developing countries, in order to permit a better assessment of the present and future of such international cooperation by the Working Group at its next session.

11. Similarly, the Committee should also request international organizations with space-related activities to continue to inform the Secretary-General annually concerning those space activities that were or could be the subject of greater international cooperation, with particular emphasis on the needs of the developing countries, in order to permit a better assessment of the present and future of such international cooperation by the Working Group at its next session.

12. Extensive cooperation should be encouraged among countries within a region through sharing their human resources, technical expertise, hardware and software for space-related projects. If a country or countries within the region find it beyond their resources to undertake a programme by themselves, the United Nations should, upon request, endeavour to coordinate with them towards establishing a regional programme addressing the needs of those countries.

13. Encouragement should be given to governmental as well as non-governmental organizations which, by means of conferences, publications and other activities, including the holding of symposia and meetings devoted to special topics, could help integrate regional and interregional efforts in order to facilitate and coordinate the space activities of scientific organizations. The United Nations should strengthen its cooperation with them, as part of its commitment to assisting developing countries to attain the benefits of space technology, including its spin-offs. Efforts should also be made by the United Nations to seek the cooperation of other international and regional bodies specialized in space activities.

14. Countries with relevant capabilities are once again encouraged to provide to the developing countries financial and technical assistance for developing low-cost community receivers for communication satellites and low-cost, preferably renewable, power sources to operate the systems in un-electrified locations.

15. The Working Group noted with appreciation the reports prepared by the Outer Space Affairs Division on the resources and technological capabilities of the States in the fields of space activities as well as in the areas of education, training, research and fellowship opportunities for the promotion of cooperation in the peaceful uses of outer space. Those reports should be periodically updated by the Outer Space Affairs Division.

16. Given the investments already made on the ground by many countries in the form of ground stations, processing equipment, data banks, software, etc., for remote-sensing data reception/analyses, satellite-operating States are urged to ensure the availability of data on a continued basis and in a form compatible with the current systems.

III. INFORMATION, STUDIES AND TECHNICAL ADVISORY SERVICES

17. Noting that some of the space applications studies recommended by UNISPACE 82 were incomplete and that some of them were limited in scope, the Working Group recommended that, based upon the studies completed so far, a few more specific studies should be carried out to demonstrate the potentials of space technology; these studies might include the following:

(i) Use of low-Earth-orbiting satellites for communications;

(ii) Remote and rural area communications and broadcasting;

(iii) Forest resources management;

(iv) Ocean resources development.

18. In order to promote better access to and experiences in higher education in space-related subjects, the United Nations should, upon request, continue to arrange for the provision of consultancy in the form of experts from the developed and developing countries in the preparation of an integrated national plan of action for initiating, strengthening or reorienting an appropriate space applications programme which should be in conformity with other national development programmes. The Working Group noted with appreciation the efforts of the Outer Space Affairs Division in the preparation of a list of experts in space technology and applications, on the basis of information provided by Member States and their national space authorities, to facilitate the exchange of consultants at the international level. This list should be periodically updated and circulated to the Member States.

IV. CONCLUSIONS

19. In concluding its comprehensive assessment of the implementation of the recommendations of UNISPACE 82, the Working Group of the Whole noted that efforts in the following areas have to be particularly intensified:

(a) Stimulation of the growth of indigenous nuclei and an autonomous technological base in space technology in developing countries. UNISPACE 82 had recommended the free exchange of scientific and technological information and an arrangement for the transfer of technologies to promote the use and development of space technology in the developing countries. UNISPACE 82 had also recommended that countries should not place undue restrictions on the sale of components, subsystems or systems required for space applications. A greater international understanding therefore needs to be evolved to overcome the difficulties faced by the developing countries in this respect;

(b) Promotion of greater exchange of actual experiences with space applications. UNISPACE 82 had recommended appropriate assistance and particularly had called upon international financial agencies to support

demonstration projects to provide opportunities for gaining hands-on experience in space technology applications for the developing nations through their direct involvement in such applications projects or pilot projects;

(c) Funding support:

(i) The Working Group regretfully noted that the budgetary allocations for the Programme on Space Applications for implementation of the recommendations of UNISPACE 82 have been meagre and inadequate in the past years and expressed its deep concern that the situation remains the same for the current year as well. In order to fully implement the recommendations of UNISPACE 82, the Working Group recommends that the Committee on the Peaceful Uses of Outer Space request the General Assembly of the United Nations to make an adequate budget allocation for the Programme on Space Applications. This recommendation is also made on the understanding that it is necessary for the Outer Space Affairs Division to give priority to the full implementation of the Programme on Space Applications in the available resources of its regular budget;

(ii) In formulating cooperative programmes and projects, the intensive participation of international and regional financial and development institutions should be encouraged by the United Nations. In this connection, the Secretariat should continue to prepare annually a report on the arrangements it has made with other organs, bodies and organizations of the United Nations system and other regional/international organizations in order to utilize fully the available resources and to secure additional financial support from other sources for continued implementation of the United Nations Programme on Space Applications.

20. International Space Year has stimulated the organization of several technical meetings, workshops, demonstrations and cooperative projects which have wider relevance, particularly in the areas of the protection of the Earth's environment and public education. It would be of great value to increase the participation of individuals from the developing countries in these forums, particularly in view of the financial constraints being faced by them. It would therefore be essential to encourage the maximum possible availability of support for travel and other assistance from various international and other sponsoring bodies for the participants from the developing countries.

21. The Working Group recommended that it be reconvened next year to continue its work.

Annex III

REPORT OF THE WORKING GROUP ON THE USE OF NUCLEAR POWER SOURCES IN OUTER SPACE ON THE WORK OF ITS NINTH SESSION

1. The Working Group on the Use of Nuclear Power Sources in Outer Space, reconvened in accordance with General Assembly resolution 46/45 of 9 December 1991, paragraph 11, held its ninth session at United Nations Headquarters from 27 February to 5 March 1992 under the chairmanship of Mr. J. H. Carver (Australia), during the twenty-ninth session of the Scientific and Technical Subcommittee.

2. The Working Group held five meetings and adopted the present report at its meeting on 5 March 1992.

3. The Working Group noted that, on the basis of the work of its eighth session, in 1990, the Legal Subcommittee's Working Group on the question had agreed on a text for draft principle 3 relating to guidelines and criteria for safe use (A/AC.105/457, annex I, para. 12).

4. The Working Group noted that the scientific and technical guidelines and criteria for the safe use of nuclear-power sources in outer space could, in the future, be reviewed and revised as necessary, as provided in draft principle 12 of the draft principles contained in document A/AC.105/C.2/L.154/Rev.10, submitted by Canada and Germany.

5. The view was expressed that the language of draft principle 3 should be clarified in order to prevent possible misinterpretation of certain of its provisions, identified in working paper A/AC.105/C.2/L.185, which had been submitted by the United States of America to the Legal Subcommittee at its thirtieth session, in 1991. It was believed that the changes in the language of draft principle 3 proposed in the working paper would meet those concerns. Other delegations expressed the view that draft principle 3 had been agreed by consensus and should not be reopened. Some delegations expressed the view that concerns regarding the scope of applicability of the draft principles should be addressed in the overall preamble to the principles.

6. The Working Group heard a presentation on the United States space nuclear-power programme, including the use of radioisotope thermoelectric generators on lunar and planetary probes, research on space nuclear reactor systems for lunar and Martian bases, and studies of nuclear propulsion systems for use outside the atmosphere.

7. The Working Group took note of a working paper submitted by Australia, Canada, France, Germany, India, Turkey and the United Kingdom of Great Britain and Northern Ireland (A/AC.105/C.1/WG.5/L.29) containing a draft text for a preamble to the set of principles, which is annexed to the present report. The Working Group agreed that the working paper provided a useful basis for discussions and might be considered further at the next session of the Legal Subcommittee, as an important contribution to efforts to finalize the principles.

Appendix

USE OF NUCLEAR-POWER SOURCES IN OUTER SPACE

Draft preamble to the principles relevant to the use of nuclear-power sources in outer space

Working paper submitted by Australia, Canada, France, Germany, India, Turkey and the United Kingdom of Great Britain and Northern Ireland*

Recognizing that for some missions in outer space nuclear-power sources (NPS) are particularly suited due to their compactness and long life;

Recognizing that the use of NPS in outer space should focus on those missions which take advantage of the particular properties of NPS;

Recognizing that the use of NPS in outer space should be based on a thorough safety assessment, with particular emphasis on reducing the risk of accidental exposure of the public to harmful radiation or radioactive material;

Recognizing the need, in this respect, for specific procedures and criteria, in the form of a set of principles, to ensure safe use of NPS in outer space;

Affirming that this set of principles applies to NPS in outer space devoted to generation of electric power on board space objects;

Recognizing that this set of principles may undergo future revisions in view of emerging nuclear-power applications and of evolving international recommendations on radiological protection.

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* Originally issued as document A/AC.105/C.1/WG.5/L.29.